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AN ANALYSIS OF SHORE STATION PLANNING IN THE UNITED STATES COAST GUARD

Robert James Heid

AN ANALYSIS OF SHORE STATION PLANNING IN THE UNITED STATES COAST GUARD

BY

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Bachelor of Science

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Master of Business Administration

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CHAPTER I

THE PROBLEM AND THE APPROACH

Recent years have seen an increasing use of multi-year budgets and planning documents for all levels of organizations. The increasing complexity of enterprises and the economic constriction has sharpened the focus on present decisions in terms of their future effects. Government and service organizations differ from manufacturing concerns in that a clear and definitive flow of quantitative results is often obscure and invisible. The outputs of government and service programs are difficult to quantify and virtually uncomparable. With the Federal budget, taxes and national debt cresting to new highs, adequate planning was no longer merely desirable but mandatory in Federal agencies.

In 1961 the Department of Defense introduced a Planning, Programming, Budgeting (PPB) System. Impressed by the results of PPB in the Defense Department, President Johnson in 1965 directed that all Federal agencies adopt a similar PPB system. The reasons for the change to a new system were:

> Under the present governmental budgeting procedures, program review for decision making has frequently been concentrated within too short a period; objectives of agency programs have too often not been specified with enough clarity and concreteness; accomplishments have not always been specified concretely; alternatives have been insufficiently presented for consideration by top management; in a number of cases the future year costs of present decisions have not been liad out systematically enough; and formalized planning and systems analysis have had too little effect on budget decisions.[1]

The United States Coast Guard, then an agency of the Treasury Department, came within the scope of the new executive directive. The thrust of PPB was to put programs in a systems framework so that analysis and comparisons could be made among the contributing elements. The Search and Rescue mission of the Coast Guard, in a systems concept, is composed of aviation units, vessels and shore facilities. The shore facilities of the Coast Guard, historically, have been treated as a separate element in the formulation of plans. The boats and men associated with the shore facilities have provided services in support of the various mission tasks levied by law and executive order.

This research study is focused on the shore unit planning activity of the United States Coast Guard. The evolution of the planning techniques used to develop shore station resource requirements will be traced. An assessment of the probable changes needed to adapt the present procedures to the changing requirements will be set forth.

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[1] U.S. Executive Office of the President, Bureau of the Budget, Bulletin No. 66-3, Planning-Programming-Budgeting (October 12, 1965), p. 1.

The Research Question

The primary research question of this thesis is: Will the planning techniques presently used by the United States Coast Guard be satisfactory for developing future shore station programs? In attempting to formulate an answer to this question, four subsidiary questions are posed. The first question concerns the present situation: What has been the evolution of the present techniques? The next question points to the adequacy of past planning: Have the past shore stations' plans been flexible, in view of changing appropriation levels of Congress, so that plans could be adjusted to show completion at a lower than desired rate rather than necessitating the rewriting of the entire plan. From these two questions an understanding of the present system will be gained.

The latter two questions deal with the future that must be considered. The first deals with externally generated change: What additional requirements have been placed upon the planning system of the Coast Guard? The last question provides a forecast of future changes: What changes and modifications to present techniques are suggested to adapt to the dynamics of national priorities?

From the answers to the four subsidiary questions, the answer to the primary research question will be formed.

Scope

The Search and Rescue Program represents about 25 percent or $112,000,000 of the total operating expense budget of the United States Coast Guard. The operating expenses of the Search and Rescue Program can be further broken down by the major facilities that perform the task of Search and Rescue--shore units, aviation units, and vessels. The shore unit portion of the total program operating expense is about 40 percent or $44,000,000.

The responsibility for planning for all operational activities of the Coast Guard is vested in the Office of Operations. Responsibility for shore unit planning has been delegated to the Plans and Programs Section, Surface Facilities Branch of the Search and Rescue Division.

Planning review takes place at many levels of staff organization, primarily in the Programs Staff of the Office of Operations and the Program Review Staff of the Chief of Staff's Programs Division. Thus, resulting programs are not singularly generated but rather represent a composit of many staff level modifications.

Shore station resources are used by the Coast Guard to perform tasks within several mission areas. The total requirement for resources must be predicated on the demands of the several mission areas. The percentage of

the Coast Guard Budget directly associated with shore station programs has not significantly changed from year to year. The total shore station plant of the Coast Guard represents a capital investment of nearly $900 million dollars. Funds for Acquisition, Construction and Improvement (AC&I) to this capital investment have averaged $2.5 million per year over the last five years. With 16 percent of the shore plant 52 years or older, the annual amount budgeted for improvements is critical.

This study addresses a small segment of Coast Guard planning--shore station planning. The magnitude of the investment represented by the shore stations, coupled with minimal AC&I funds and in light of the increasing age of the stations, presents a critical planning situation if efficient and effective operations are to continue.

Organization of the Study

The structure of this thesis generally follows the standard pattern for studies of this nature. The second chapter provides a brief history of the United States Coast Guard. The present organizational structure is shown. The roles and missions of the service are set out. This chapter provides the necessary background for a more complete understanding of the planning that appears in subsequent chapters.

Chapter III describes the evolution of shore station planning from the early days to the present. The success of the various planning activities will be related.

In the forth chapter the requirements for planning, programming, and budgeting will be reviewed. The capabilities of the current system will be evaluated in terms of the changing requirements of the Search and Rescue Program and the Coast Guard in general.

Finally, the concluding chapter contains the research findings, conclusions of the thesis and recommendations for further action where such is indicated.

CHAPTER II

BACKGROUND INFORMATION[1]

The history of the United States Coast Guard goes back more than a century and three quarters to the founding years of the United States. This Nation dates from the signing of the Declaration of Independence on July 4, 1776. A constitutional form of government did not begin until 1789. On August 4, 1790, President George Washington signed into law an act authorizing the construction of ten boats for guarding the coasts against smugglers.[2] The Congress had passed shipping tariffs as a means of raising funds to support the activities of the Federal government and to pay the national debt.

Alexander Hamilton, as Secretary of the Treasury, was faced with the task of collecting revenues to support the Federal government. The established customs offices ashore were ineffective in collecting the shipping tariffs and, thus, the Revenue Cutter Service became the seagoing enforcement arm of the Federal government. The task of

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[1] The material in this section is drawn from many sources such that detailed footnoting would unnecessarily burden the readers. For a definitive history of the Coast Guard see: Stephen N. Evans, The United States Coast Guard 1770-1915 (Annapolis, Maryland: The United States Naval Institute, 1949).

[2] Act of August 4, 1790 (1 Stat. L., 145, 175).

enforcing compliance with the customs law was to prove challenging to the newly formed service, for in the years of struggling for independence and refuge from taxation, smuggling had become an accepted way of life that was not to be readily changed.

The Congress in 1799 directed that the "Revenue Cutters shall, whenever the President of the United States shall so direct, cooperate with the Navy of the United States."[1] This legislative foundation provided for a cooperative situation that exists until the present day; that the Coast Guard functions in a civil executive department under normal circumstances but is shifted to a military department in time of war or at such other times as the President directs.

In 1789 the Revenue Cutters conducted extensive action against the French privateers when directed by President John Adams to assist the Navy. It wasn't until the War of 1812 that the Revenue Cutters were called upon again to assist the Navy. At the conclusion of that conflict in 1815 the cutters turned their attention toward pirates and slave ships. In the next few years, more than five hundred slaves were liberated by the cutters enforcing the law forbidding their importation.

In 1832 South Carolina acted to "negate and nullify" the Federal tariff on imports. Five cutters were

---

[1] Act of March 2, 1799 (1 Stat. L., 627, 699)

dispatched by President Andrew Jackson to enforce the law. The cutters impounded the cargo of ships entering the Charleston harbor. A crises developed that was only to be rectified by Henry Clay's Tariff Compromise of 1833.

In 1836 the Revenue Cutters saw action against the Seminole Indians in Florida. While engaged in these operations the Cutter WASHINGTON is credited with conducting the first amphibious landing of combined forces by the United States. This action precluded by more than a century similar operations by United States and allied forces in World War II.

In April 1861, the Cutter HARRIET LANE fired the shot generally conceded the first of the Civil War, when she fired on the steamer NASHVILLE. The NASHVILLE was attempting to slip into Charleston harbor without proper display of her colors. The cutters served with the Navy in the blockade of southern ports which prevented European supplies from reaching the Confederate forces.

At the conclusion of the Civil War, the Revenue Cutters were returned to Treasury control and enjoyed a long period of calm until the Spanish-American War in 1898. Eighteen cutters saw action in that war.

The history of the Coast Guard spread to the distant shores of Alaska immediately after the ratification of the Treaty of Purchase in 1867. Lieutenant George W.

Moore, U.S. R-M. was the United States government's first special representative to the new territory.

Subsequent years saw the Revenue Cutters establishing contact with the remote fishing villages and providing medical care to the natives. This aid was to continue for many years in the form of annual summer cruises in the Alaskan waters.

These summer cruises also carried judical officers to dispense justice. Court was frequently held aboard the cutters with officers serving as Deputy United States Marshalls or other appointed court officials.

Additional law enforcement duties were undertaken in the protection of fur seals which were faced with extinction from pelagic sealing. The cutters by their efforts were able to curtail this practice of killing seals as they slept floating on the water surface. Fur seals are today a flourishing resource.

The Revenue Cutter personnel, cooperating with the Bureau of Education and the Fish Commission, transported from Siberia the first domestic reindeer. Reindeer herds continue to be of great economic importance to the Eskimos. Summer cruises continued until the 1960's when permanent airfields were constructed and radio communications made the native villages a part of the outside world.

The sinking of the TITANIC on her maiden voyage in 1912 shocked the entire world. In the fall of 1913, an international conference drew up a treaty that would provide for derelict destruction, ice patrol services and observation. The United States was invited to assume the management and operation of this service. It was agreed that the cost of this patrol would be shared by the maritime users of the service. The ice patrol duties were undertaken by the Revenue Cutter Service at the direction of the President in 1913 and have continued to the present day.

In 1915 the Revenue Cutter Service and the Lifesaving Service were merged and the Coast Guard was formed. To the Lifesaving Services, the Coast Guard owes the greatest portion of its traditions with respect to Search and Rescue activities.

The words "Plan 1 Acknowledge" once again signaled the transfer of Coast Guard units to the Navy. On the morning of April 6, 1917 the United States went to war against Germany and fifteen cruising cutters manned by more than 5,200 officers and men were placed under Navy control. Naval action of this period was almost exclusively concerned with anti submarine warfare. The Coast Guard participated in this effort by convoying cargo ships and protecting troop transports.

With the signing of the armistice the Coast Guard once again reverted back to the control of the Treasury. In the following years the Coast Guard fell to low esteem in the eyes of the public, for to the service fell the burden of enforcing the unpopular eighteenth amendment and the prohibition of the importation of alcoholic beverages. Congress gave little support to the Coast Guard's efforts and so the service was greatly relieved when repeal came.

In 1939 the Lighthouse Service, which had been a part of the Commerce Department since 1910, was returned to the Treasury Department. Rather than returning to its former bureau status, the service was incorporated into the Coast Guard.

With the United States entry into the Second World War in December 1941, the Coast Guard again became a functioning part of the Navy. The number of weather patrol stations were increased, convoys were escorted, beach patrols were established, troop transports were manned, and Coast Guardsmen provided the expertise in operating the landing craft used in the amphibious assaults.

The Bureau of Marine Inspection and Navigation of the Commerce Department was temporarily transferred to the Coast Guard in 1942 so as to improve wartime management.

In 1946 the transfer became permanent and the Coast Guard took on the task of inspecting merchant vessel design, construction and alterations.

The return of peace in 1945 brought problems of contraction in the force level. The readjustments to normal peacetime size was almost complete when expansion was required to staff and support the program of long range electronic navigation aids (LORAN) that had begun during the war and was now expanding. Additional expansion was required to provide increased search and rescue needed to protect logistic routes of the Korean War. Additional weather stations in the Pacific were manned to assist air and sea traffic.

As in earlier times, the ceasation of hostilities again dictated a reduction in force. A steady and conservative expansion to meet the increasing public demand was the course dictated for the Coast Guard. As the Viet Nam War intensified the Coast Guard was called upon to assist. Twenty-six patrol boats answered the call and were assigned duties patrolling the coast searching for contraband arms and munitions being shipped into the country to supply the Viet Cong. As the war grew on, five large cutters were added to the conflict. The larger cutters provided needed support for the smaller patrol boats and also provided an off-shore barrier patrol that would

interdict illicit arms shipments further off shore. Electronic navigation stations were rushed to completion to provide the most accurate means of navigation to the Southeast Asia area. Additionally, Coast Guard forces were called upon to provide expertise in the supervision of the off loading of explosives and the maintenance of a navigation system for the rivers and coastal area. To date, the original twenty-six patrol craft and two of the cutters have been turned over to the South Vietnamese Navy. The Coast Guard forces will have a continuing support function for the time that American forces remain. Thus, Coast Guard history spans more than one hundred-eighty years of domestic and foreign service.

THE FIRST SHORE STATIONS

The Life Saving Service began with the Massachusetts Humane Society.[1] This society was established in 1785, patterned after the Royal Humane Society of England, as a volunteer force to assist endangered mariners. Through the years these guardians of the coasts received much acclaim for their rescues in the pounding surf.

In 1849 Congress passed the Lighthouse Act which provided funds for the construction of several lighthouses

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[1] Evan J. David, Our Coast Guard (New York: D. Appleton-Century Company, 1937), p. 295.

on the Atlantic Coast in an effort to prevent marine tragedies. With the passage of this act a systems approach to maritime safety was begun which provided for preventative as well as remedial actions.

In 1848 Congress appropriated funds to provide surfboats, rockets, and carronades to assist the lifesaving work of these volunteer surfmen. The equipment purchased by federal funds was distributed to the surf stations but little if any control was maintained at a central level.

In 1870 Congress made a small appropriation to pay six experienced surfmen for each of the boats at alternate life saving stations on the New Jersey Coast from December 15th to March 15th. The federal government had realized the importance of having a full-time force ready to respond to an emergency even in the times of low traffic and little chance for a distress situation. This action was to signal the beginning of the end for this respected volunteer organization.

The Organic Act of 1878 gave to the Life Saving Service the status of a regular unit of the Treasury Department and established a Board on Life Saving Appliances. The threads of improved management and control were being woven.

In 1880 horses were purchased for hauling the beach rescue equipment from the stations to the scene of

the distress. The introduction of the motorboat, telephone, and radio revolutionized the service.

The dynamics of change reached a peak on January 28, 1915, when the Coast Guard was formed by joining the Revenue Cutter Service and the Life Saving Service. Modernization has occurred and the transition from the surfboat to the motorboat has required the relocation of many of the original stations to a protected position within the river mouths and inlets.

Duties[1]

The Coast Guard of today is an agency charged with the performance of tasks in a great variety of mission areas. These duties may be grouped in the program areas of Search and Rescue, Aids to Navigation, Law Enforcement, Military Readiness, Merchant Marine Safety, and Oceanography and Polar Operations.

The Search and Rescue mission involves the responsibility of the Coast Guard to render aid and assistance to persons and property endangered or in distress on, over or under the high seas and waters of United States jurisdiction. To provide assistance to vessels on the high seas, the Coast Guard developed a computerized position reporting system that allows the

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[1] The prominent work defining Coast Guard missions is: U.S. Treasury Department, A Study of the Roles and Missions of the United States Coast Guard, 1962. 7 vols.

Coast Guard to determine, in the event of a disaster, the location of any vessel in the area of the reported distress. The program is joined voluntarily by furnishing the Coast Guard with sailing information as to port of departure, destination, speed, trackline and any changes in initial plans. This information is updated daily by reports from the participating vessels.

Also included in this mission area is the service of keeping domestic harbors and waterways open to commerce. Domestic icebreaking is carried out on the Great Lakes and on the rivers and harbors of the Northeast as well as Alaska.

The Aids to Navigation mission area covers the system that provides the necessary position fixing services for mariners. Buoys, fixed markers, and lighthouses mark sealanes, harbors and coastal waters. A system of long range electronic aids vertically blankets the globe providing services for merchant vessels and military alike.

The Coast Guard acts as a maritime policeman in the mission area of Law Enforcement. The myriad of laws, regulations, treaties and agreements are enforced and monitored by the Coast Guard to promote compliance. The large majority of these are connected to the conservation of natural resources.

The Coast Guard is charged with standing ready as a military force to defend the country. During peacetime the Coast Guard trains with and is evaluated by the Navy so that transfer to the Navy in time of conflict would be as uneventful as possible.

The mission of Merchant Marine Safety covers certificating of personnel to man the merchant vessels of the United States. Inspection is made of all vessels that are under construction or being refurbished to insure complete compliance with the regulations. Periodic inspection of ships and drilling of their crews in proper emergency procedures help to insure a high level of safety in the United States merchant fleet.

Recently, additional requirements have been placed on the Coast Guard to inspect foreign vessels that operate from our ports a large part of the time. The purpose of these inspections is to lessen the probability of recurrence of a disaster such as recently beset several foreign vessels with a large number of United States citizens aboard.

Rapid increase in mission workload has occurred in the field of Oceanography and Polar Operations. The ocean station weather patrols have continued with an added requirement to obtain oceanographic data as to

water temperature vs. depth, salinity, water samples, charting ocean bottom contours and checking the composition of the ocean floor.

The Coast Guard has taken over the operation of all United States icebreakers. Five heavy ocean going icebreakers formerly operated by the Navy have been transferred to the Coast Guard. These icebreakers are operated in accordance with the national program of polar operations in coordination with the Navy and the National Science Foundation.

While no means all inclusive as to total responsibilities, the foregoing indicates the broad range of Coast Guard interest and involvement. In the broadest sense of the word, the Coast Guard reaches to every corner of the globe with men stationed from Thailand and Viet Nam to Turkey and Iran with vessels and aircraft ranging from Arctic to Antarctic.

Organization

In order to quickly adjust to being transferred from department to department, the Coast Guard is structured so as to fit neatly into the organization of the U.S. Navy when called upon.

The Coast Guard has been organized into two Areas and Twelve districts. For obvious reasons these district

boundaries coincide closely with those of the Navy (See Figure 1). Within several districts there are units that report directly to the Commandant and these units are designated as Headquarters Units.

The two Area Commanders are charged with coordinating incidents and activities that affect more than one district. The Area Commanders are charged with carrying out the Ocean Station program. Area Commanders have no forces assigned and must coordinate forces within several districts.

Within the Department of Transportation, the Coast Guard is one of six independent agencies (See Figure 2). The Commandant of the Coast Guard reports directly to the Secretary as do the heads of the other five agencies.

The chain of line command extends from the Commandant to the District Commanders and then to the individual Unit Commanders. The various offices at the Headquarters level serve as staff to the Commandant through the Chief of Staff (See Figure 3). Each office is made up of several divisions which in turn are subdivided into branches and sections.

While its operations are decentralized, the functions of planning in the Coast Guard are centralized at the Headquarters staff level.

U.S. COAST GUARD DISTRICTS

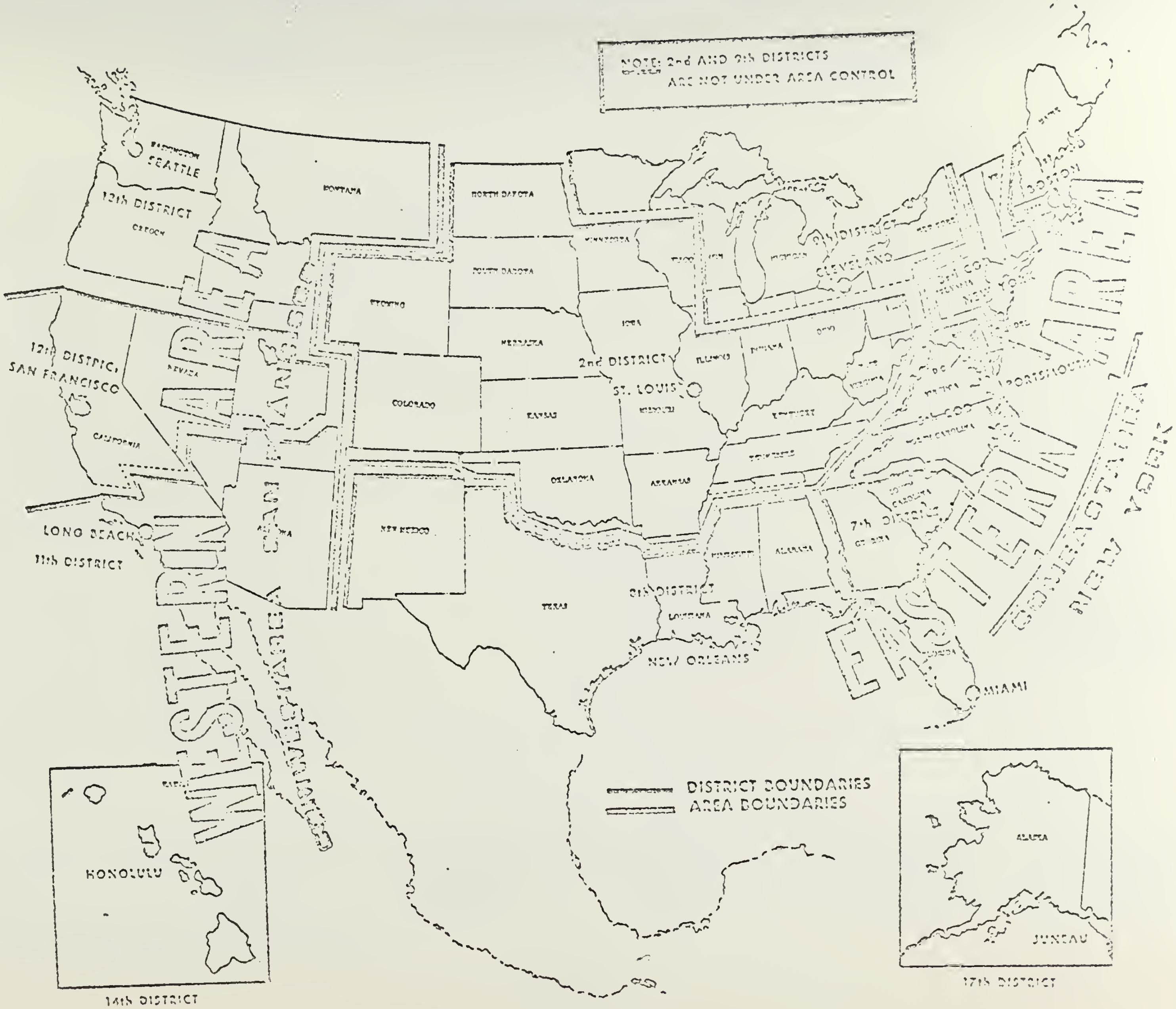
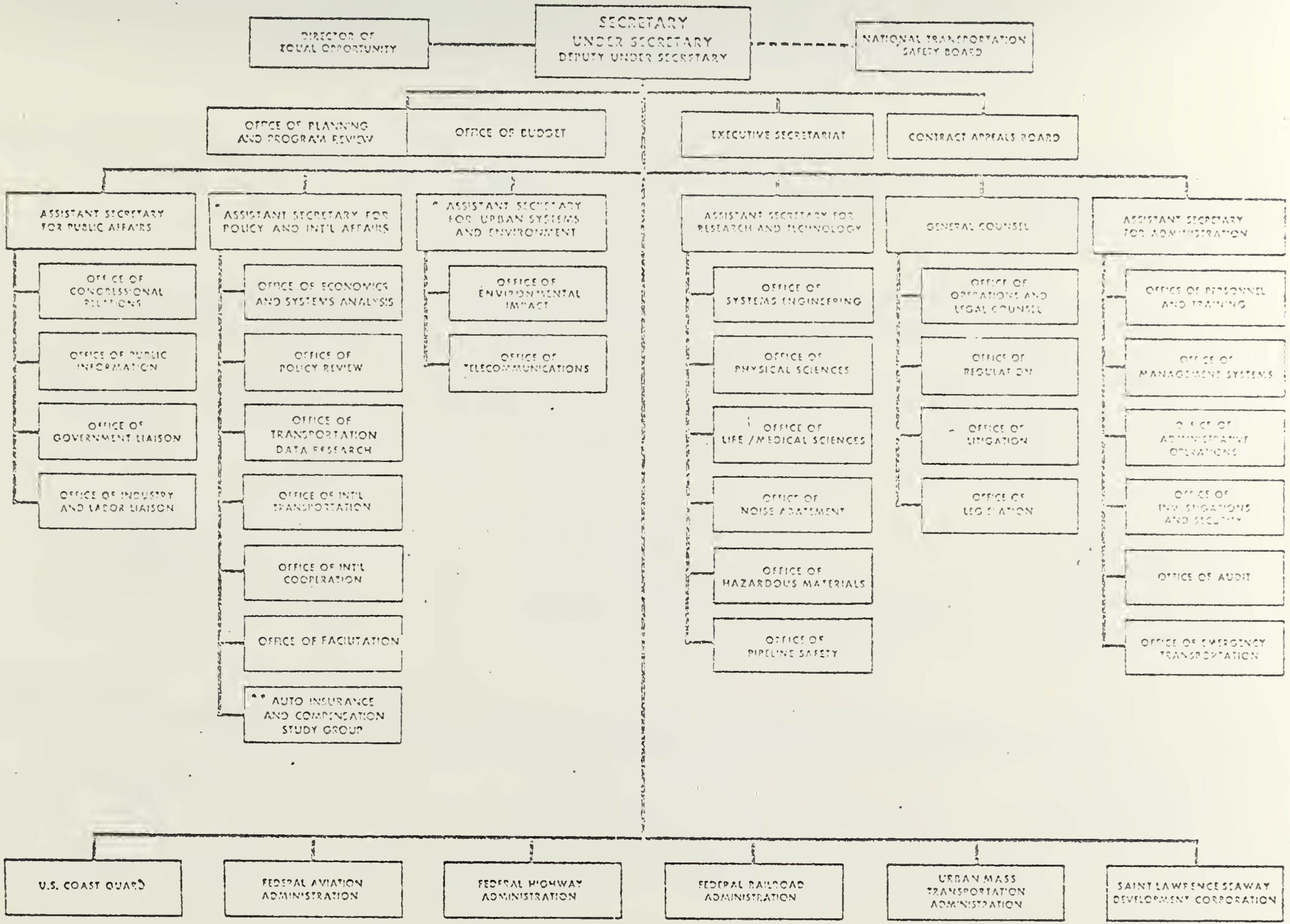


FIGURE 1

DEPARTMENT OF TRANSPORTATION


SECRETARY
UNDER SECRETARY
DEPUTY UNDER SECRETARY
DIRECTOR OF EQUAL OPPORTUNITY
NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF PLANNING AND PROGRAM REVIEW
OFFICE OF BUDGET
EXECUTIVE SECRETARIAT
CONTRACT APPEALS BOARD
ASSISTANT SECRETARY FOR PUBLIC AFFAIRS
OFFICE OF CONGRESSIONAL RELATIONS
OFFICE OF PUBLIC INFORMATION
OFFICE OF GOVERNMENT LIAISON
OFFICE OF INDUSTRY AND LABOR LIAISON
* ASSISTANT SECRETARY FOR POLICY AND INT'L AFFAIRS
OFFICE OF ECONOMICS AND SYSTEMS ANALYSIS
OFFICE OF POLICY REVIEW
OFFICE OF TRANSPORTATION DATA RESEARCH
OFFICE OF INT'L TRANSPORTATION
OFFICE OF INT'L COOPERATION
OFFICE OF FACILITATION
** AUTO INSURANCE AND COMPENSATION STUDY GROUP
* ASSISTANT SECRETARY FOR URBAN SYSTEMS AND ENVIRONMENT
OFFICE OF ENVIRONMENTAL IMPACT
OFFICE OF TELECOMMUNICATIONS
ASSISTANT SECRETARY FOR RESEARCH AND TECHNOLOGY
OFFICE OF SYSTEMS ENGINEERING
OFFICE OF PHYSICAL SCIENCES
OFFICE OF LIFE / MEDICAL SCIENCES
OFFICE OF NOISE ABATEMENT
OFFICE OF HAZARDOUS MATERIALS
OFFICE OF PIPELINE SAFETY
GENERAL COUNSEL
OFFICE OF OPERATIONS AND LEGAL COUNSEL
OFFICE OF REGULATION
OFFICE OF LITIGATION
OFFICE OF LEGISLATION
ASSISTANT SECRETARY FOR ADMINISTRATION
OFFICE OF PERSONNEL AND TRAINING
OFFICE OF MANAGEMENT SYSTEMS
OFFICE OF ADMINISTRATIVE OPERATIONS
OFFICE OF INVESTIGATIONS AND SECURITY
OFFICE OF AUDIT
OFFICE OF EMERGENCY TRANSPORTATION
U.S. COAST GUARD
FEDERAL AVIATION ADMINISTRATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL RAILROAD ADMINISTRATION
URBAN MASS TRANSPORTATION ADMINISTRATION
SAINT LAWRENCE SEAWAY DEVELOPMENT CORPORATION

* THESE ASSISTANT SECRETARIES WERE DESIGNATED ON 2/7/1969 AND THEIR ORGANIZATIONS ARE IN THE DEVELOPMENTAL STAGE

** EXPIRES MAY, 1970

FIGURE 2

DEPARTMENT OF TRANSPORTATION
U.S. COAST GUARD ORGANIZATION

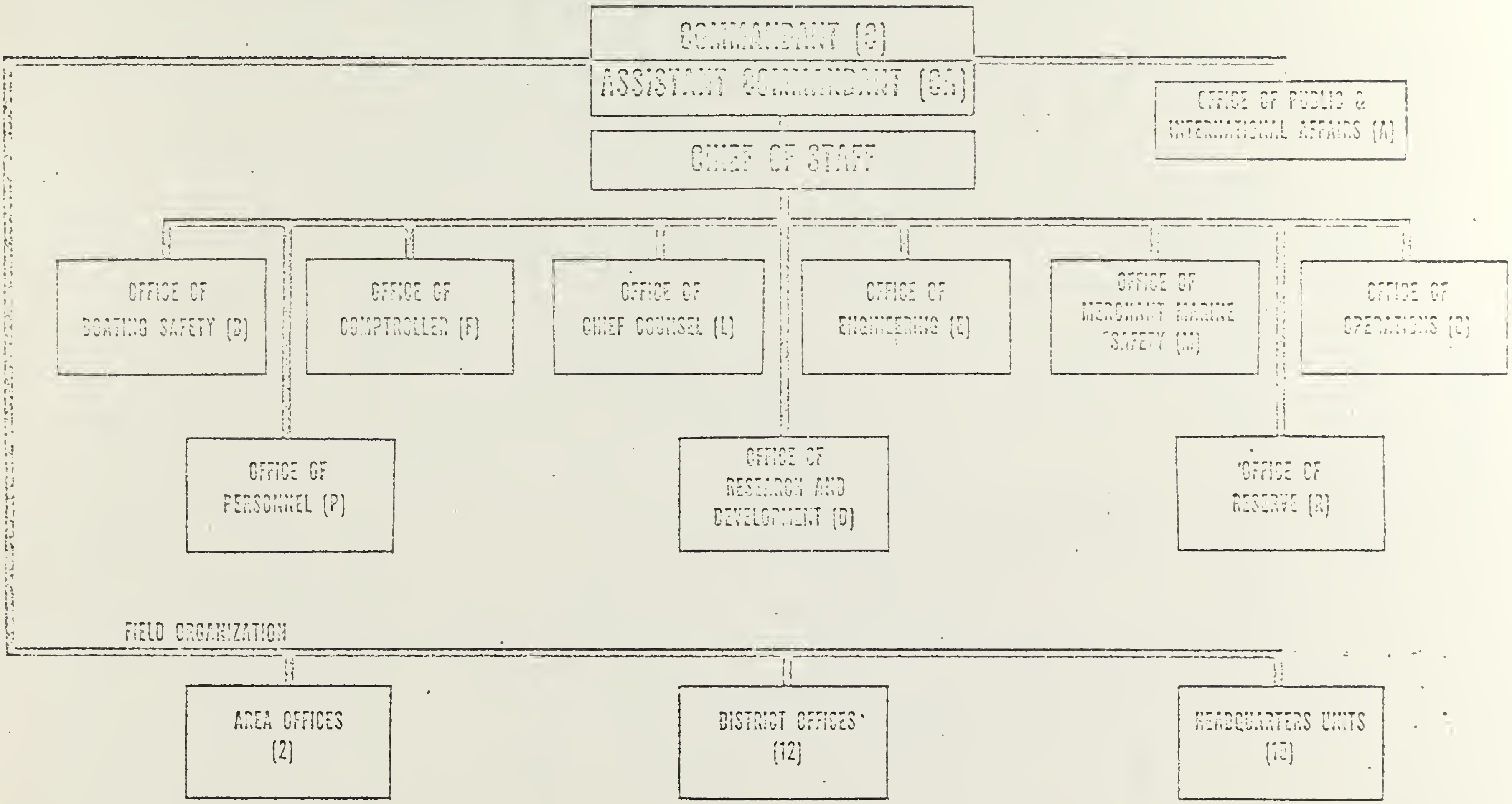

COMMANDANT (G)
ASSISTANT COMMANDANT (GA)
CHIEF OF STAFF
OFFICE OF PUBLIC & INTERNATIONAL AFFAIRS (A)
OFFICE OF BOATING SAFETY (B)
OFFICE OF COMPTROLLER (F)
OFFICE OF CHIEF COUNSEL (L)
OFFICE OF ENGINEERING (E)
OFFICE OF MERCHANT MARINE SAFETY (M)
OFFICE OF OPERATIONS (O)
OFFICE OF PERSONNEL (P)
OFFICE OF RESEARCH AND DEVELOPMENT (D)
OFFICE OF RESERVE (R)
FIELD ORGANIZATION
AREA OFFICES (2)
DISTRICT OFFICES (12)
HEADQUARTERS UNITS (13)

FIGURE 3

CHAPTER III

SHORE STATION PLANNING

Capital Expenditure Planning

Prior to World War II, the Coast Guard had no central staff charged with the performance of long range planning. Each major organizational unit at Headquarters concerned itself in certain phases of these functions on an individual basis in a manner that seriously inhibited adequate coordination of common endeavor and that encouraged duplication and lost motion. A small Permanent Board, to a limited extent, assisted the Commandant in the study of major problems and the development of basic plans and programs. The Assistant Commandant functioned as Chief Operations Officer of the service and exercise central operational control of the Coast Guard forces. The Commandant himself, with the assistance of the assistant Commandant engaged directly in planning, operating and controlling activities of the service.

The period following World War II until the early 1960's was characterized by a growth in the planning staffs within Coast Guard Headquarters with the formal planning action conducted by an ad hoc committee. During this period

the Office of Operations was organized in a facility orientation rather than a strictly functional arrangement.

The operational planning for Search and Rescue (SAR) facilities in a specific geographic area usually originate with the District Commander. District proposals for SAR, as for other aspects of operation, are usually first submitted to Headquarters in the form of an operations planning proposal. The operations planning program is coordinated by the Office of Operations.

Another primary planning activity which must be considered is provided by special boards convened to examine aviation facilities, floating units, and shore units. These special boards examine overall Coast Guard needs, and in doing so they have used proposals already submitted to call for special information. The reports of these boards provide a long range, integrated program for replacement of obsolete equipment, establishment of needed facilities and regrouping of present facilities.

The impetus to conduct the aviation requirements study of 1957 came from a source external to the Coast Guard organization. During an appropriation hearing before a Congressional Committee, a question arose as to the long-range plans for replacement and use of aircraft. The Coast Guard was not able to provide a satisfactory answer

and was told in so many words to come back when it could.[1] This set in motion a study which produced what was known as the Aviation Plan. Plans for vessels and shore units soon followed.

The early efforts in long range planning resulted in the promulgation of three separate facility plans. The aviation requirements report was completed and approved in 1957, and later re-evaluated and reapproved in 1961. The vessel requirements report was completed in November, 1959. The shore unit report was completed in 1962. Each of these facility oriented plans indicated that very large appropriations would be required to bring about the modernization that was expressed in each.

When the U.S. Treasury Department began to see the magnitude of the cost required to modernize the Coast Guard facilities, it was decided a major realignment of Coast Guard operations was necessary to provide an adequate framework for long range planning.

Roles and Missions Study[2]

A comprehensive study of Coast Guard roles and missions was completed during 1961-62 by an inter-agency group composed of representatives from the Bureau of the

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[1] Walter C. Capron, The United States Coast Guard, (New York: Franklin Watts, Inc., 1965), p. 200.

[2] U.S. Treasury Department, Study of the Roles and Missions of the United States Coast Guard, Report to the Secretary, June 1962 (7 vols.; Washington, D.C.: Government Printing Office, 1963), I, p. C-28. [Cited hereafter as Roles and Mission Study.]

Budget, Department of Defense, and the Treasury Department. The Roles and Missions Study was undertaken at the request of Secretary of the Treasury, Douglas Dillion, with the objective of clarifying the duties and responsibilities of the Coast Guard so as to provide a sound basis for long range planning. The Roles and Missions Study grouped Coast Guard duties and responsibilities into ten mission-oriented categories: Search and Rescue, Aids to Navigation, Merchant Marine Safety, Reserve Training, Ice Breaking, Oceanography, Military Readiness, Port Security, Ocean Stations, and Law Enforcement.

The Roles and Missions study has had far-reaching effects. An early, direct outgrowth of the study was the development of United States Coast Guard Objectives.[1] The purpose of Coast Guard Objectives was stated in the forward. "The objectives contained herein are a first step toward a long range planning structure responsive to those requirements."[2]

The objectives were based on four basic assumptions. The first was the assumption that the broad base growth of the United States, with a corresponding increase in Coast Guard workload, would continue. The second assumption was that fiscal resources would permit modernization of existing Coast Guard facilities and provide sufficient funds

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[1] U.S. Treasury Department, Coast Guard, United States Coast Guard Objectives (CG-378), 1964.

[2] Ibid., p. i. (Requirements meaning statutory missions, clear policy and operational guidelines).

to carry out the expanded workload and responsibilities. A third assumption was that the Cold War would continue on all levels short of unlimited war. The fourth and final assumption was that international cooperation among the free and uncommitted nations of the world would increase in importance.[1]

The development of plans and programs to meet mission objectives has been guided by the Roles and Mission Study and Coast Guard Objectives.

Shore Units Plan

> The Coast Guard shore plant is scattered over nearly three-quarters of the globe. Coast Guard manned and maintained sites extend east and west from the South China Sea to the Straits of Bosporus and from the Arctic Circle to the Equator. Excluding 23,000 buoys, fixed Coast Guard structures exist in 18,300 different geographic locations and consist of 880 manned units and 18,000 unmanned installations. Of the 880 manned units, 670 represent significant monetary investments in both construction and maintenance costs. Due to variance in operational demands and geographical conditions, there are major differences in nearly all structures.[2]

Thus, the general overview to the shore unit situation is set forth in the Shore Units Plan. The Coast Guard plant has evolved over many years from the agencies which comprise the present day Coast Guard. Structures

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[1] Ibid. pp. 6-7.

[2] U.S. Treasury Department, Coast Guard, Shore Units Plan, (CG-380), 1962, p. II-1.

still are in operational use which were built for the Life Saving Service and others which were placed under Coast Guard jurisdiction when the Coast Guard and Lighthouse Service amalgmation took place. Experience with maintenance of this composit plant has revealed five major problem areas:

1. Age
2. Exposure to the elements
3. Obsolescence
4. Rising costs
5. Limited plant replacement funds

Age

Sixteen percent of all shore stations are currently 50 years old and another 16 percent are over 30 years old.[1] Implementation of the Shore Units Plan will not appreciably alter the upward trend of aging.[2] It is known that while age and costs increase together their rates are disproportionate.

Exposure to the Elements

Most fixed structures are located in exposed locations subject to severe ravages of nature. Erosion of the shoreline has, in some areas, changed navigable channels and harbor entrances necessitating structural changes and rebuilding or relocating of facilities.

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[1] Lieutenant Commander C.S. Mincks, USCG, Chief Programs Section, Surface Facilities Branch, Search and Rescue Division, Washington, D.C., February, 1971.

[2] Shore Units Plan, p. II-1.

Obsolescence

Technical developments, particularly in the aids to navigation field, have made constant changes necessary in audio, visual and electronic equipment installations. Wherever it is economically sound, manned units have been and will be converted to unmanned units provided the required level of performance can be furnished.

Rising Costs

This item is always of concern and it is common knowledge that the period of 1960 to 1970 was a period of rapidly increasing costs for labor, materials, and construction. A fixed ceiling type budget for maintenance is not compatible with these increases.

Limited Plant Replacement Funds

Replacement funds are obtainable from two sources:

1. A small amount from the Operating Expense Appropriations if the project is under $50,000.
2. The major part from the Acquisition, Construction and Improvement Appropriation (AC&I).

The planned program of replacement to overcome obsolescence is based on a 50-year service life or 2 percent replacement per year. "At the present time the replacement value of the shore establishment is approximately $650 million and therefore $13 million will be required annually."[1] The present value of the shore plant is

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[1] _Shore Units Plan_, p. II-3.

estimated at $900 million and would indicate that about $20 million should be spent annually for replacement. The amount of AC&I funds spent for improvements, rehabilitation, or new construction for Search and Rescue shore stations since 1967 are shown in Table 1.

TABLE 1

SAR PROGRAM AC&I FUNDING
(Amounts in Thousands of Dollars)

Fiscal Year	Total SAR	Air Stations	Vessels	Shore Units
1967	29,807	26,600	-	3,207
1968	37,577	26,950	2,956	7,671
1969	15,870	11,500	-	4,370
1970	16,020	14,900	-	1,120
1971	14,915	13,080	180	1,355
1972*	35,600	30,100	-	5,500
1973**	30,310	21,410	-	8,800

NOTES: Compiled from U.S. Coast Guard Annual Operating Budgets.

* Data for 1972 derived from Congressional Stage Budget.

**Data for 1973 derived from Forecast Stage Budget

The annual appropriations for shore station AC&I funds have not reached the desired level of $13 million that is calculated to maintain the operational level of the present shore plant.

The decision making process concerning capital investments is admittedly most difficult. The difficulty of this type of decision making is characterized by Joel Dean as follows:

> Making decisions on capital expenditures is one of the most demanding responsibilities of top management. There are few guideposts for determining either the amount or kind of investment to make. Without such guides, decisions are made on the basis of ill-defined standards and intuitive judgment. There is a need for an analytical framework that will systematize management's approach to this problem.[1]

The problem of developing guides for capital expenditures within the Coast Guard is clouded and distorted by the multi-mission nature of most facilities.[2] Multi-mission stations are proposed and funded by the primary mission sponsor. Likewise the operating expenses of these multi-mission stations are charged to the major mission program. Search and Rescue is the major program

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[1] Joel Dean, Capital Budgeting, (New York: Columbia University Press, 1951, preface.

[2] Lieutenant Commander J. O. Sullivan, USCG, Budget Coordinator, Search and Rescue Division, personal interview at Coast Guard Headquarters, April 25, 1971.

in the Coast Guard, consuming in excess of 25 percent of all operating funds.[1] If the operating costs for these multi-mission stations were structly allocated to all programs (Search and Rescue, Aids to Navigation, Port Security, Boating Safety, etc.) the overall cost of the Search and Rescue program would be reduced. Most Coast Guard field units, such as ships, air stations, and bases, are multi-functional and are costed to programs through a computer-assisted blend of cost reports and operational statistics.

The problem that the shore units face is one of competition for the allocation of scarce resources. Competition comes from within the Search and Rescue program and from all other programs. Within the SAR program comparison between buying shore stations or aircraft or vessels is possible because each produce benefits, in terms of the SAR program, that are quantifiable. Difficulty arises when the decision must be made between dissimilar projects, i.e. search and rescue and aids to navigation, with benefit measures that are not comparable. At this point the analytical framework breaks down, and judgment must weigh the merits and produce a decision.

Charles J. Hitch and Roland N. McKean point out that economic efficiency in the allocation and use of

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[1] Ibid.

resources can be promoted through a better understanding of the nature of the problem, the systematic quantitative analysis of alternatives, and improving the environment or framework within which resource allocation decisions are made.[1] A greater understanding of the allocation problem is gained through analytical study.

Operational Expenditure Planning

The Coast Guard and other government agencies have tranditionally used the requirements or priorities approach to resource allocation. Under the requirements approach, requirements are derived from a feasible plan, in terms of resources and desired characteristics, which appear to solve the problem. Frequently, requirements are based on need alone with little attention given to relative costs of different resources. Under the priorities approach, desirable items are ranked according to degree of need. The efficient allocation of resources is seldom achieved under either method.[2] The three facility plans, aircraft, vessels, and shore units, had been conceived in near isolation of each other--a condition which does not permit the efficient allocation of resources to meet an objective.

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[1] Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age (Cambridge, Mass.: Harvard University Press, 1961), p. 107.

[2] Morris D. Helton, "The Planning, Programming, Budgeting System as a Coast Guard Management Tool," (Unpublished MBA Thesis, School of Government and Business Administration, The George Washington-University, 1970), p. 2.

Former President Eisenhower expressed the interface between competing programs as follows:

> The cost of one modern bomber is this: a modern brick school in more than 30 cities. . .two electric power plants, each serving a town of 60,000 population. . . two fine, fully equipped hospitals. . . some 50 miles of concrete highway.[1]

The previous statement indicates the comparability of program costs but does not approach the hidden portion of the iceberg, the matter of relative priorities of program benefits and objectives. The matter of priorities of competing programs is most difficult to quantify and treat analytically; and it will not be dealt with in this paper. This section will deal with the analytic study that has had a direct impact on the shore units and specifically, shore station planning.

In 1962 the Roles and Mission Study recognized the nature and degree of the problem confronting Coast Guard planners when it stated:

> The problem is basic: How can one correlate the tremendous number of variations in a manner that will permit an orderly, and reasonably scientific, process of decision making? The variables are almost limitless; some of the more significant variables are: type of vessel or aircraft in distress, the number of people involved, the location of incidents, the distance to be covered by Coast Guard assisting resource, the number and type of assisting resources required,

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[1] Dwight D. Eisenhower, "The Change for Peace," an address reprinted in The Department of State Bulletin, April 27, 1953, p. 600.

> the number and frequency of incidents now and future, other mission requirements, and the availability of resources to supplement those of the Coast Guard. Some of these variables may be taken into consideration using traditional methods of experience and judgment to establish numbers and location requirements. Placement of all of these in juxtaposition cannot be done manually.[1]

The Roles and Mission Study had realized the need for, and recommended the use of modern operational analysis techniques in 1962.[2]

The year 1967 was a year of change for the Coast Guard for in April its long relationship with the Treasury Department ended and its association with the Department of Transportation began. The Commandant ordered an "Administrative General Quarters" to speed the process of realignment under the new department and to identify problem areas within existing programs that required clarification. It was at this time that the Aviation Issue Study (a significant revision of the Aviation Plan) was submitted to the Commandant. The Aviation Issue Study constructed, to a greater extent than ever before, a firm quantitative foundation beneath the planning for aviation resources and provided several innovations from previous plans.[3] The very process of answering questions inevitably creates more questions also pertinent to the general problem, and so it

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[1] Roles and Mission Study, I, p. C-40.

[2] Ibid., p. C-44.

[3] U.S. Department of Transportation, Coast Guard, SAR Criteria and Force Analysis, 1st interim report, June 1968, p. 1 [Hereafter designated as SAR Study].

was with the Aviation Issue Study. The Commandant specifically directed that further analysis be conducted concerning:[1]

(1) development of search and rescue effectiveness criteria which are applicable to all means of effecting rescue,

(2) refinement of the forecasting techniques to determine future levels of search and rescue flight hours,

(3) analysis of alternative manning and readiness policies,

(4) analysis of alternative maintenance policies,

(5) analysis on an integrated basis (cutter, shore stations, and aircraft) of alternative search and rescue forces.

As an initial step to conducting the required studies it was necessary to select an approach to the problems. Before proceeding with such an approach the thought occurred that perhaps the questions raised were not the real problems but only symptoms of the real problem.[2] It was reasoned that if item 5 above could be appropriately structured, then it would meet the needs of all five studies and would also: (1) serve to reorient Coast Guard SAR planning to an output orientation and (2) provide a framework for integration of

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[1] Ibid.

[2] Captain N. P. Ensrud, Chief, Plans Staff, Office of Operations, personal interview, April 13, 1971.

previous SAR studies. Thus, the SAR Criteria and Force Analysis was born.[1]

The statement of the purpose of the study reads as follows:[2]

> To define search and rescue and the range of potential Coast Guard involvement therein and
>
> To identify the advantages, disadvantages and ramifications of alternative Coast Guard roles so that top management can make informed decisions on future activities.

Having set down a purpose, the desired end product was conceptualized as "a dynamic, integrated, analytical decision-making process for allocation of resources and deployment of SAR forces and facilities."[3]

The ambiguity of modern management terms requires an explanation of terms. Dynamic was intended to convey an ability to reflect change with the passage of time, capable of staying abreast of change.

Integrated was meant to indicate a whole entity comprised of components each viewed in the framework of the whole. Particularly the interaction of various resources to accomplish the overall mission requirements as opposed to a fragmented viewpoint.

Analytical was intended to denote a breakdown into components and subsequent examination to determine

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[1] Ensrud, Interview.

[2] SAR Study, 1st Interim Report, p. 4.

[3] Ibid.

relationships in the complex overall problem. Analysis implies quantification where such is possible, but as important recognizes the necessity of identification of non-quantifiable items.

A decision-making process intended to assist the decision-maker in understanding the effects of his decisions and thus arriving at a better course of action. This process is intended as an aid not a substitute.

The study was structured so as to be flexible, allowing for adoption to change without need for major restructuring. With these thoughts in mind the structuring is shown in Figure 4. This structure of the study was presented to and accepted by top management which subsequently lead to the study being designated a Major Program Issue (MPI) for FY-70.[1]

The initial work of structuring the SAR Criteria and Force Analysis was accomplished by several persons assigned to Headquarters who had previously been engaged in analytical study efforts. The study team was increased by the addition of several officers with recent experience in the operational aspects of search and rescue.[2] The blend of analytical and operational expertise that evolved on the

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[1] U.S. Congres, Joint Economic Committee, The Analysis and Evaluation of Public Expenditures: The PPB System, A Compendium of Papers submitted to the Subcommittee on Economy in Government, 91st Congress, 1st. sers., (Washington, D.C.; Government Printing Office, 1969), Vol. 2, Part IV, p. 671.

[2] Ensrud, Interview.

DIAGRAM OF SAR DECISION - MAKING PROCESS

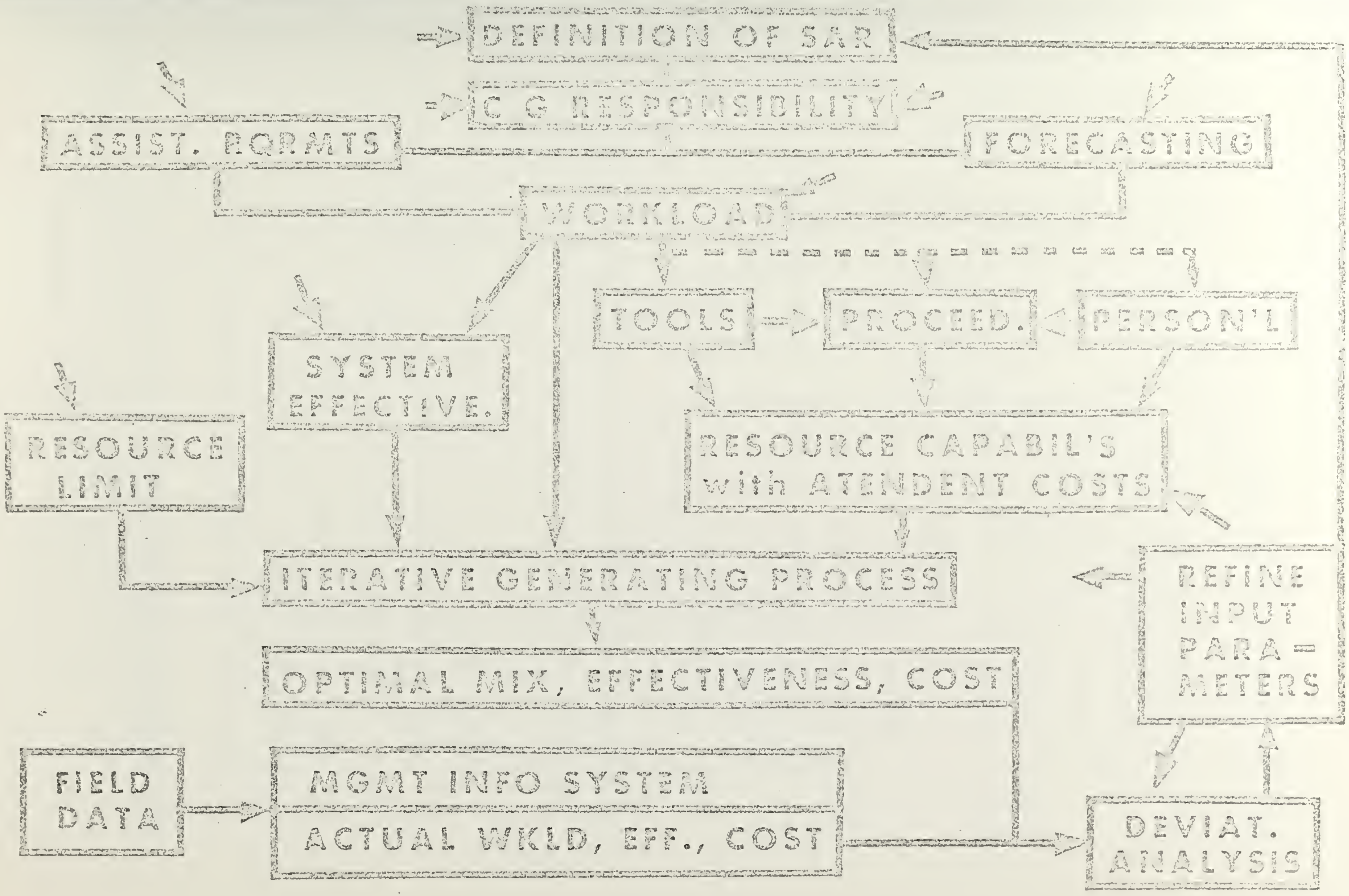

Figure 4

study staff is considered by Victor Lazzaro to be the ideal composition for a systems study.[1]

Having developed a structure, the procedure was to analyze each element identifying all variables where possible and specifying interfaces between the various elements. Periodic discussions with top management insured the steady course of the study efforts and provided guidance as to the scope of the first two elements.

The definition of SAR was accepted as the definition in the National Search and Rescue Manual. The range of Coast Guard involvement or responsibility was limited, for study purposes, to the present statutory authority of the Coast Guard as specified in Title 14 of the United States Code.[2] The period from November 1967 until August 1968, was one of formalizing the structure of the study by means of interactive discussions with top management.

The work of defining the study structure did little if anything to limit the scope of the problem. It was apparent that addressing the entire problem as a unit was not feasible. As with most large analytical efforts it became necessary to modularize the study. Individual modules would be designed to interface with each other.

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[1] Victor Lazzaro, ed., Systems and Procedures: A Handbook for Business and Industry, (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1968), 2nd ed., p. 31.

[2] SAR Study, 1st Interim Report, p. 8.

The initial module selected was the shore unit with its boats. The selection was based on consideration of relative independence of activity, homogeneity of resources, percentage of the total problem and level of true decision making.[1]

It was determined that queuing theory was appropriate to describe the server-client relationship in the SAR program. The use of a queuing model utilizes the arrival rate of clients coming into the SAR system and the service time required to complete the required assistance. So that the queuing model functions properly, the arrival rate of assistance cases must conform to a Poisson distribution and the service times must be described by a negative exponential distribution.

Data to develop the distributions for arrivals and service was available in the master file of Assistance Reports that is maintained at Coast Guard Headquarters. From the SAR data on file, it was determined that the arrivals did conform to a Poisson distribution at a 95 percent confidence level; and that the service time distribution could be satisfactorily described by a negative exponential distribution.[2] The arrival and service

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[1] SAR Study, 2nd interim report, p. ix.

[2] SAR Study, 2nd interim report, p. 8. (The negative exponential was a conservative fit to the actual data and it was realized that a better fit could be possible with an Erlang distribution. For this initial run through the model the conservative approach was chosen.)

time distributions were developed on a station-by-station basis so as to describe the workload at a particular shore station.

Attention was then directed to the resources, small boats, personnel, etc., that might be available at shore units through 1980, the time frame for the initial analysis.

A detailed analysis of the resources presently available or that appeared likely to be developed concluded that while several new innovative watercraft looked promising for the future, none were likely to be operationally effective until at least the latter part of the 1970's.[1]

The procedures for the use of small boats offered little room for reducing service times. Speed of the boat is a factor in limiting the time to arrive on scene, but since most cases involved towing at rather slow speeds, which is dictated by the hull strength of the pleasure craft, increased speed would only slightly shorten total case duration.

The personnel policies that applied to shore units were reviewed. From this analysis a new manpower utilization standard was developed that "sought to strike a balance between economic feasibility, desired retention

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[1] _Ibid._

levels, esprit de corps and the general competitive situation for human resources."[1] The original recommendation of the study group was for a work week standard of 52 hours; however, after review by the Commandant the standard was set at 68 hours for planning purposes.[2] The adoption of a new workweek standard for shore units was considered a major break through in shore unit planning.[3] Many shore stations had in the past operated with workweeks in the range of 120 hours especially during the heavy peak season.[4] For the period of the second interim report the greatest efforts of the study team were focused on the development of a model that would measure the effectiveness of various levels of forces at shore stations.

The basic philosophy that had determined past SAR force levels was that a human life was so precious that almost any expense was justified if it could be expected to save a life. Thus, rescue stations were ready to launch all boats attached at all hours of the day or night because a demand might arise for them and a delay in response would cost lives.[5]

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[1] Ibid., p. 12

[2] Ensrud, Interview.

[3] Mincks, Interview.

[4] Commander C. Robbins, USCG, Administrative Assistant, Search and Rescue Division, personal interview, April 28, 1971.

[5] SAR Study, 2nd interim report, p. 14.

Despite the rapid response of Coast Guard units to each case as it arose, there were approximately 1400 lives lost annually on the waters in question. The SAR system saves about 2350 lives a year and calculations indicated prevention of the deaths of about 2100 additional persons annually.[1]

The effectiveness of the SAR system could be expressed as the number of lives saved and deaths prevented divided by the sum of lives saved (LS) plus lives lost (LL) plus deaths prevented (DP). For 1967 this gave an effectiveness of 76%.

$$\frac{LS + DP}{LS + DP + LL} = \frac{2354 + 2078}{2354 + 2078 + 1394} = 76\%$$

An obvious decision would be to increase the number of resources to save additional lives and thus improve system efficiency. The presumption being that the lives lost were capable of being saved by a reactive force, namely the Coast Guard.

There existed a file of investigative reports that probed into each incident that led to a fatality. These reports were reviewed to establish the validity of the presumption. The review concluded that in fact few, if any, of the lives lost could have been saved by any reactive force. The presumption was faulty.[2] The thrust

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[1] *Ibid.*

[2] *Ibid.*, p. 16.

of this review was to show that the existing effectiveness was near 100%.

The hypotheses that reducing the time to reach the scene of an incident would yield significant increase in the number of persons rescued was placed in question. It was hypothesized that further delay in response could be accepted with only a slight increase in the probability of experiencing additional deaths. If this hypothesis could be accepted the general workload could be segregated into two distinct classes, serious and non-serious.

The fact that the majority of distress incidents were reported directly to the Coast Guard by the distressed craft via radio telephone greatly enabled the shore unit personnel to accurately evaluate the situtation as to serious or non-serious at the time of notification. With two distinct types of cases the model could be programmed with a set of operational rules that approximated the real world situation. In fact, the station personnel indicated that from information given to them by a distressed craft they were able to determine if the case needed urgent attention.[1] This is a significant fact that had not been previously considered. Here was a specific example of disagreement between planning and operations. Planning was done on the basis of total uniform workload with every case considered

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[1] Ensrud, Interview.

serious, and, in fact, the operations were conducted on the basis of a two state severity.

In terms of the analytical model, this meant that an operational rule would be required to allow for the servicing of serious cases on a priority basis and delaying the non-serious cases if another resource was not available when the request for assistance came in. If a resource was idle it would answer immediately any case coming into the system. The objective being to give priority service to the cases (serious) where a delay could result in a "disbenefit" or in this case, either death, injury, or property damage which would lessen the net benefits and efficiency of the system.

The model was constructed with a priority interrupt rule for serious cases arising when resources were engaged in processing a non-serious case. The model accounted for the unsymmetrical weekly distribution of cases and also the day and night distribution of cases. The model utilized the existing SAR data files to produce, for each station, the parameters required by the model, namely; arrival rate, service rate, severity, and recognition factor. There was one required input, the maximum allowable risk level in terms of a percentage of serious cases to which response was delayed. This risk level was initially set at 3 percent.

The output of the model would be an hourly listing of the ready boats that were required so as not to exceed the 3% criteria. Also on an hourly basis the number of delays that would probablistically be expected were shown. The delayed cases were listed first as total cases delayed and serious cases delayed. There were then further classified as the number of cases delayed between specified time intervals, i.e. X cases delayed for 0 to 15 minutes.

The benefit of this model was that the manager could now see how the number of man-hours (in the form of ready boat crews) could be compared and equated to a risk of delaying an assistance case.

The question now arose as to what the desired level of response capability was to be at a particular station. Previously, it had been erroneously accepted that every case was receiving immediate response, now we are saying that the level of response can be managed. This method of trade-off analysis was presented to the Commandant and accepted at the 3 percent risk level as a tentative planning tool.[1]

The Commandant directed that this analytical technique be brought to the attention of all district planning officers. On May 14-16 a planning seminar was held in Washington, D.C. for all field planning offices.[2]

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[1] At the 3 percent risk level virtually no serious cases were delayed, however the possible reductions in manhours per week was very significant.

[2] SAR Study, 2nd interim report, p. 43.

Skeptical at first, these officers realized the need to combat the great increase in the work week due to the seasonal increases at shore stations. These officers returned to their commands prepared to carry out the Commandant's desires.

Clearance for a full scale test was granted and the Boston-Group, comprising five shore stations, was selected as the test location. The test was conducted from the weekend prior to Memorial Day weekend until two weeks after Labor Day. The readiness policy, the number of ready boat and man hours per week, was specified for each station on the basis of the 3 percent risk criteria of the model. The readiness policy was very closely adhered to, with the net results of the period showing that not a single case, serious or non-serious was delayed. More significant was the fact that the work week in terms of man-hours at the station had been held to between 68 and 72 hours as compared to the previous years that approached 120 hours.

During the week of October 12th, 1968, the annual District Commanders' Conference was held at Washington. These field commanders had heard from their planning officers about the analytical model "that was suppose to solve the SAR problem."[1] Realizing the demands placed on

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[1] Ensrud, Interview.

"their people" for long duty hours, they listened attentively at the rationale and basic assumptions were explained.[1]

The theory of risk was explained and well received realizing that the actual risk would be small but the benefits in terms of reduced workweek would be great. The comparison of risk to boat crew man-hours per week was explained in terms of trade-off analysis shown in Figure 5.[2]

Most shore stations were maintaining readiness policies in the range of points 7 and 8 shown in Figure 5, which accepting the rationale as presented, indicated that the point of diminishing returns had been exceeded and to add more personnel and resources would be of little or no benefit to the SAR program. One field commander went as far to state that if a station provides no benefits in terms of lives saved, perhaps it should be closed.[3]

The analytical model attempts to quantify the major variables that make up the shore station SAR activity so as to allow management to more closely determine demand and staff to meet the probabilistic workload rather than consuming excess resources.

A short coming of the model is that it does not reflect inputs from other mission areas. For these multi-mission stations other mission workloads would have to be

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[1] Ibid.

[2] U.S. Department of Transportation, Coast Guard, Report of Area and District Commanders Conference, 11-18 October 1968, p. 6-8.

[3] Ibid., p. 6-14.

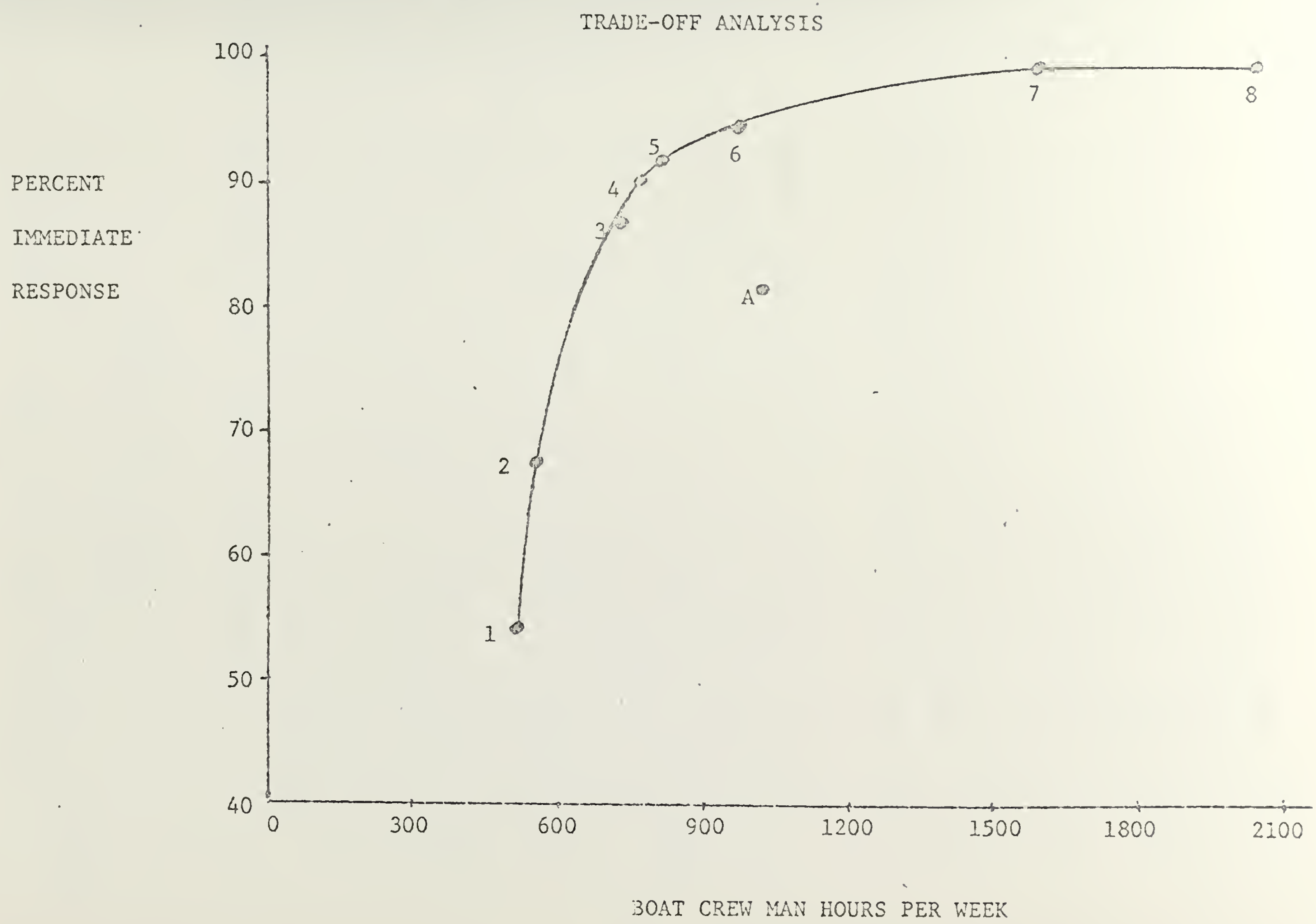
TRADE-OFF ANALYSIS
PERCENT
IMMEDIATE
RESPONSE
100
90
80
70
60
50
40
0
300
600
900
1200
1500
1800
2100
1
2
3
4
5
6
7
8
A
BOAT CREW MAN HOURS PER WEEK

Figure 5

determined to provide the complete resource demand at a given station. The model indicates the utilization of each resource used which would indicate the "slack time" available for secondary mission work such as aids to navigation or law enforcement. In all probability a work measurement survey, such as the Booze, Allen & Hamilton work measurement survey done for the Coast Guard in 1950 could be used to determine requirements for the non-SAR workload.[1]

Another approach would be to revise the SAR assistance reporting system to include reports on the utilization of all resources for all missions. This would place all data in a machine processable format and the analytical model could treat the utilization of resources as a non-serious SAR incident and treat it in the queue program. Possibly, a decision rule could be written into the model such that all SAR would be processed before any secondary missions were undertaken. The feasibility of adapting the model to handle the entire mix of mission workloads does exist with today's technology.

Look to the Future

Having designed an analytical model for the shore unit, it was desirable to adapt this model to other

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[1] Booze, Allen & Hamilton, Survey of Job Classification and Work Measurement, December 1950.

homogeneous resources of the SAR program, namely patrol boats. This would be in keeping with the planned course of the study. As with most analysis the press of time prevented the full development of the process that was envisioned at the outset.

The development of a simulation model to more nearly reflect the results of readiness postures of all resources, aircraft, vessels, and shore units, was begun in February 1970. The simulation approach was accepted because of the difficult and complex nature of designing a model to accommodate the aircraft and vessel responses to SAR. It was estimated that to build these models would require as long as five years to complete.[1] This would not satisfy the SAR mission manager nor would it satisfy the Commandant.

The simulation, designated SARSIM, was envisioned as dealing with an entire district with upwards of 150 resources assigned. The SARSIM would give management the facility to play "what if" games in the employment and assignment of resources. The number, location, type, and employment policies of resources would be variable. The SARSIM greatly increases the flexibility of alternatives open to the manager. The SARSIM suffers the basic failing of the analytical model in that it treats only the SAR

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[1] SAR Study, 3rd interim report, p. 7.

workload and any other mission requirement must be "added on" to develop the total picture. As of this writing the SARSIM is operational and is undergoing testing and validation. It is anticipated that it will be operational for use by management in July 1971.[1]

It is interesting to note that in 1962 the Roles and Mission Study stated that:

> The problem is basic: How can one correlate the tremendous number of variations in a manner that will permit an orderly, and reasonably scientific, process of decision-making? The variables are almost limitless; some of the more significant variables are: the type of vessel or aircraft in distress, the number of people involved, the location of the incidents, the distance to be covered by assisting vessels or aircraft, the number and type of vessels or aircraft required, the number and frequency of incidents future and current, other mission requirements, and the availability of facilities to supplement those maintained by the Coast Guard.[2]

The Roles and Mission Task Force recognized the magnitude of the problem and suggested a possible avenue towards solution when they further stated that: "Consideration should be given to the use of one of the more prominent and tested operations research techniques---simulation."[3]

There are several distinct advantages of the SARSIM approach to the problem.

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[1] Ensrud, Interview.

[2] Roles and Missions Study, p. C-40.

[3] Ibid.

a. The Coast Guard's involvement in a project of this magnitude and complexity would allow Coast Guard personnel to become increasingly knowledgeable and self-sustaining in the field of operations research, thus providing a future base of planning expertise.

b. The SARSIM will require extensive use of the SAR data base which in turn will highlight the required modifications to the SAR reporting system so as to maintain an information flow responsive to management's dynamic needs.

It is generally agreed that the SAR Criteria and Force Analysis Issue Study to date represents a significant evolutionary step in the Coast Guard's management of resources.

Summary

The development of analytical methods of analysis has greatly increased the range of program alternatives. Heretofore, all or nothing decisions were predominant but now incremental changes are possible.

The shore station analytical model has made it possible to quantify benefits associated with incremental changes. The concept of a facility less than a shore unit in size was developed as an outgrowth of the analytical model. The station at Jonesport, Maine, has been reduced

to six persons from sixteen.[1] The station grounds and buildings no longer exist as Coast Guard property. Operations are conducted from rented pier space in town. The subunit has only to be ready to proceed when called by telephone, there are no additional duties such as watchstanding or general maintenance. By tailoring the response capability to meet or just exceed the demand is a start towards suboptimizing the SAR program.

The analytical techniques have focused on the minimization of operational expences rather than directly looking at future capital expenses.

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[1] Lieutenant Commander W.B. Howland, Assistant Chief, SAR Systems Staff, personal interview, 8 April 1971.

CHAPTER IV

APPRAISAL OF COAST GUARD PLANNING

Federal Planning Requirements

Federal planning requirements were directed by the President on October 12, 1965, when Bureau of the Budget Bulletin No. 66-3 was issued. This bulletin introduced an integrated Planning, Programming, Budgeting System in the Executive Branch of the federal government.

Previously, stress had been on the setting of goals, defining objectives and developing planned programs for achieving objectives. The basic concepts of the new system were:

> (1) The existence in each agency of an analytic capability which carries out continuing in-depth analyses by permanent specialized staffs of the agency's objectives and its various programs to meet these objectives.
>
> (2) The existence of a multi-year Planning and Programming process which incorporates and uses an information system to present data in meaningful categories essential to the making of major decisions by agency heads and by the President.
>
> (3) The existence of a Budgeting process which can take broad program decisions, translate them into more refined decisions in a budget context, and present the appropriate program and financial data for Presidential and Congressional action.[1]

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[1] U.S. Executive Office of the President, Bureau of the Budget Bulletin No. 66-3, Planning-Programming-Budgeting, October 12, 1965, p. 2.

Essentials of the planning, programming, budgeting systems are listed as:

> (1) An output oriented (This term is used interchangeably with mission-oriented or objectives-oriented) program structure which presents data on all of the operations and activities of the agency in categories which reflect the agency's end purposes or objectives.
>
> (2) Analyses of possible alternative objectives of the agency and of alternative programs for meeting these objectives. Many different techniques of analysis will be appropriate, but central should be the carrying out of broad systems analyses in which alternative programs will be compared with respect to both their costs and their benefits.
>
> (3) Adherence to a time cycle within which well-considered information and recommendations will be produced at the times needed for decision-making and for the development of the President's budget and legislative programs.
>
> (4) Acceptance by line officials with appropriate staff support, of responsibility for the establishment and effective use of the system.[1]

The output products of the system are a multi-year program and financial plan, which is updated on a systematic basis and analyses which includes both program memoranda and special studies which are in-depth analyses of specific topics. The requirements of the program and financial plan are that:

(1) It will be structured on a group of output oriented categories that cover the total work of the agency.

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[1] Ibid., pp. 2-3

(2) It will be projected for a period of years, normally, five.

(3) It will include all contemplated as well as present activities of the agency.

(4) It will show appropriate levels for the entire period as determined by the agency head.

(5) It will express objectives and planned accomplishments in quantitative non-financial terms which were possible.

(6) It will relate the program activity to the total universe being served.

(7) It will provide financial data associated with physical data to show the cost of carrying out the program.

(8) It will translate the costs into the terms used in budget preparation.[1]

The purpose of the analysis in the system is stated as:

> An analytical effort will be undertaken to examine deeply program objectives and criteria of accomplishments. Wherever applicable the effort will utilize systems analyses, operations research, and other pertinent techniques. The analyses should raise important questions, compare the benefits and costs of alternative programs and explore future needs in relationship to planned programs. The sources of data used will be many, including most importantly, the Program and Financial Plan, special studies done throughout the agency, and budget, accounting

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[1] _Ibid_. pp. 5-7.

> and operating data. It is important to have continuity in the work of staffs doing this work, and to build expertise in them over a period of years. As expertise is developed, more and more of the agency's activities can be subjected to these analytical techniques.[1]

The planning, programming, budgeting system thus requires the development of a series of plans by the Coast Guard with an orientation towards mission outputs. These plans must be based on stated objectives in each mission area. Assumptions and decision criteria must be specifically listed and alternative ways of attaining the objectives must be explored. Lastly, the dollar requirements must be fully set out, so that benefits can be compared with costs, and then the conversion must be made to the financial term of the federal budget system.

This last step is critical because it is necessary to do concrete things, such as purchase vessels, aircraft, construct a building, or hire a person. Mission accomplishment, however, comes only indirectly from these actions. The Congress insists upon appropriating funds for things and employees, and requires that budgets be so presented.

The Planning, Programming, Budgeting System is a system that emphasizes strategic planning in the management of government. The system differs from that previously

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[1] *Ibid.*, p. 7

used in that it requires examination of the entire program rather than just examining departure from an established base level.

Present Coast Guard Capabilities

The PPB system has resulted in a more specific and concrete expression of Coast Guard objectives and accomplishments. The use of an output-oriented program structure based on objectives has forced the Coast Guard to develop criteria for determining the cost effectiveness and cost benefit of programs, and to evaluate policies followed in the conduct of specific programs. As a result, quantitative non-financial measures of outputs and benefits have been developed for most Coast Guard programs.[1] As an illustration the Coast Guard Search and Rescue (SAR) Program will be discussed in terms of quantified outputs, benefits, and effectiveness. The Coast Guard program structure is shown in Figure 6.

Search and Rescue is a major operating activity of the Coast Guard in terms of resources used. Search and Rescue resources are nearly all multi-mission and include in addition to command and control facilities, 176 shore stations and bases with boats attached, 36 high endurance cutters, 24 medium endurance cutters, 79 patrol craft, and

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[1] Morris D. Helton, "The Planning, Programming, Budgeting System as a Coast Guard Management Tool." Unpublished MBA Thesis, School of Government and Business Administration, The George Washington University, 1970.

Program Area	Program (Program Element)	Program Director	Program Manager
1. Search and Rescue	1. Search and Rescue	Chief, O	Chief, OSR
	2. Domestic Icebreaking	Chief, O	Chief, OSR
2. Aids to Navigation	3. Short Range Aids to Navigation	Chief, O	Chief, OAN
	4. Aids to Navigation (Loran A)	Chief, O	Chief, OAN
	5. Aids to Navigation (Loran C)	Chief, O	Chief, OAN
	6. Bridge Administration	Chief, O	Chief, OAN
3. Merchant Marine Safety	7. Commercial Vessel Safety	Chief, M	Deputy M
4. Law Enforcement	8. Port Safety and Security	Chief, O	Chief, OLE
	9. Enforcement of Maritime Laws and Treaties		
	10. Maritime Pollution Control	Chief, O	Chief, OLE
5. Recreational Boating Safety	11. Boating Safety	Chief, B	Deputy B
6. Oceanography, Meteorology and Polar Operations	12. Ocean Stations	Chief, O	Chief, OMS
	13. Polar Operations (Water)	Chief, O	Chief, OMS
	14. Polar Operations (Science)	Chief, O	Chief, OMS
	15. Oceanographic Activities	Chief, O	Chief, OMS
7. Military Preparedness and Operations	16. Military Operations	Chief, O	Chief, OMR
	17. Military Preparedness	Chief, O	Chief, OMR
8. Reserve Training	18. Coast Guard Reserve Forces	Chief, R	Deputy R
		Support Director	Support Manager
9. General Support	19. Training	Chief, P	P Staff Asst.
	20. General Administration	CCS	Chief, CPA
	21. Retired Pay	Chief, P	P Staff Asst.

Coast Guard Program Structure

Source: U.S., Department of Transportation, Coast Guard, Planning and Programming Manual (CG-411), October 15, 1969, p. II-2.

Figure 6

114 operational aircraft.[1] The cost of the SAR program for fiscal year 1970 totaled $116 million, or slightly over 20 percent of the Coast Guard budget. The trend of the SAR program cost as a percentage of the total Coast Guard budget is shown in Figure 7.

The objective of the Search and Rescue Program is "to render aid to persons and property in distress on or over the high seas and waters subject to the jurisdiction of the United States."[2] The output of the Coast Guard SAR program is measured by the number of SAR sorties, the number of SAR responses, and the number of SAR cases responded to.[3] These outputs are quantitative measures of the end products produced by the SAR program. Such measures are useful for internal planning and programming; however, they do not measure the degree to which the SAR program accomplishes its objective (effectiveness) or the

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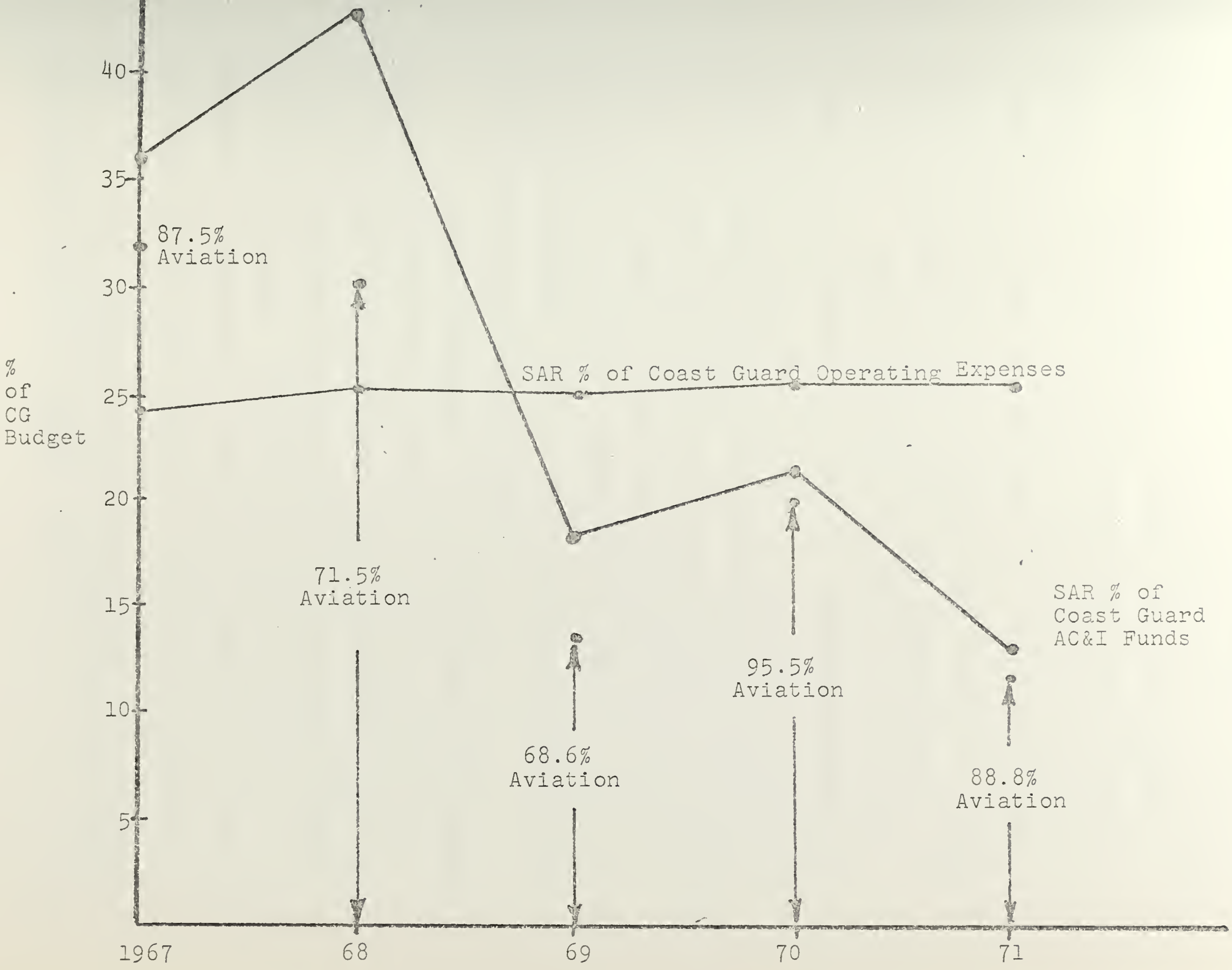
[1] U.S. Department of Transportation, Coast Guard, Coast Guard FY 1971 Program Proposals, April 30, 1969, p. 196.

[2] Ibid.

[3] A SAR response represents action taken by one Coast Guard operating facility. For example, an air station sending three planes on a SAR case would get credit for one response; a ship proceeding on the same case would be credited with one response; and a shore station sending one or more boats on the same case would also be credited with one response--three responses for one SAR case responded to. A SAR sortie represents a single voyage, flight, or trip made by a piece of SAR hardware. In the example above, the air station would count three sorties, the ship one, and the shore station one for each boat sent out.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SAR % of
Coast Guard
AC&I Funds

utility (benefit) derived from the SAR program. Benefit measures are required for program analysis and for decisions making regarding trade-offs between competing programs.

The program objective for SAR indicate that the benefits should be analogus to the "rendering of aid to persons and property in distress. . ." The benefits of a program that renders aid to persons and property in distress must be measured in terms of what the program does for the clientele. The most important function is the saving of lives, or the prevention of death. Secondary benefits are prevention of the loss of property, prevention of injuries, relief of anxiety, and so on. Unfortunately, techniques do not exist for measuring some of these benefits in quantitative terms. The benefit of the Coast Guard SAR program is measured by the number of deaths prevented, the number of injuries prevented, and the value of property saved as the result of Coast Guard SAR efforts.[1]

Deaths prevented, injuries prevented, and property damage prevented are considered to be valid measures of benefits from safety programs. Many organizations that are safety oriented use "actual deaths" as the primary program benefit descriptor. The number of actual deaths is important information for management to have, but it does not indicate the total benefits. Using actual deaths as

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[1] U.S. Department of Transportation, Coast Guard, Memorandum from Chief of Staff to Program Directors, Program Definitions, March 12, 1969, p. SAR 5.

the indicator of benefits would fail to reveal that no lives were being saved by the program.

The Coast Guard SAR reporting system provides the data necessary to determine with a fairly high degree of accuracy, how many lives would have been lost. Data on the actual deaths are available from three sources, the SAR information data file, the Boating Safety file of accident investigations, and also the Commercial Vessel Safety Program of the Office of Merchant Marine Safety. The SAR reporting system also provides data on injuries prevented and the value of property saved as a result of the SAR program, however, these benefits are difficult to measure.

The effectiveness of the Coast Guard SAR program has been discussed in the preceeding chapter. The effectiveness of the SAR program can be estimated; however, any finer measurement would require an all inclusive information system that would ensure that all deaths and lives saved were properly recorded. The present system, admittedly, is not 100 percent accurate. A new system, while it might include more data, would be more expensive.[1] The present level of effectiveness should be considered acceptable provided that a judgmental decision, based on sound logic, can be used to evaluate incidents where a death has occurred and subjectively state whether the incident was within the capabilities of the SAR forces. If an individual does not

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[1] Howland, Interview.

survive the initial incident, his death should not be chargeable against the effectiveness of the reactive SAR forces. Documented cases exist where persons have fallen overboard while alongside a Coast Guard rescue unit and even here, where search and transit time need not be considered, a life was lost.[1] It appears that some threshold level exists where the number of lives lost cannot be greatly reduced by the addition of more reactive forces.

The SAR program has a stated objective and produces outputs that are quantifiable. Direct benefit measures do exist and are reported and collected. The SAR program meets the federal government's requirements for PPB. With three types of facilities competing for program funds, it appears that all the requisite information exists for management to utilize a benefit-cost analysis as an aid to decision making.

SAR Program Costs and Benefits

The use of costs and benefits as a means of comparing shore stations has assisted in identifying the marginal benefit, low workload stations. Justification for the closing of five shore stations has been largely centered around the costs and benefits of these individual stations. Congressional opposition has not been nearly as strong with

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[1] Ensrud, Interview.

closings based on this type analysis. Minor concessions had to be made in a few instances to provide partial coverage to the area for daylight hours during summer periods of boating activity; a small proce to pay to close a station that had been selected for closing many years earlier.[1]

The resource allocation problem within the SAR program appears to lend itself to a cost-benefit type analysis. Table 2 depicts the comparative positions of the three resource types within the SAR program. At first glance, Table 2 would seem to indicate that the shore units provided the greatest portion of benefits and at a greatly lower cost than the other resource types, and should in aggregate be entitled to a greater share of AC&I fund for rehabilitation and reconstruction. Undeniably, the shore units provide the foundation for the SAR program in terms of benefits and assistance cases responded to. The AC&I funding within the SAR program is shown in Table 1. It is clearly evident that the aviation facilities were being modernized and increased at the expense of a balanced replacement program across facilities.

Justification for the "favored" position of aviation, in terms of AC&I expenditures, can be traced to the fact that since the conception of Coast Guard aviation

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[1] Howland, _Interview_.

TABLE 2

COST BENEFIT COMPARISON OF SAR RESOURCES

Fiscal Year	Air Stations		Vessels		Shore Units	
	Operating Expenses	Lives Saved	Operating Expenses	Lives Saved	Operating Expenses	Lives Saved
1965	-	616	-	346		1,022
1966	-	435	-	986		1,208
1967	-	417	-	414		1,523
1968	$33,430,000	446	$27,355,000	342	$20,803,000	1,522
1969	$32,546,000	310	$19,321,000	343	$21,480,000	1,398
1970	$37,878,000	-	$19,182,000	-	$21,594,000	-

NOTE: 1. OE Costs are actual costs as allocated to the SAR Program. OE Cost data for years prior to 1968 was allocated on a significantly different basis and is not shown.

2. SAR Data for 1970 is not available due to installation of new computer facility.

in 1915 it has been the one resource that is truly multi-mission in use.[1] The use of aircraft in Coast Guard work was envisioned by 2nd Lieutenant Norman B. Hall and 3rd Lieutenant Elmer F. Stone in 1915 while serving aboard the Cutter ONONDAGA.[2] The initial use of aircraft was considered for locating derelicts drifting in the sealanes. Today Coast Guard aircraft span all missions from search and rescue to oceanography and oil pollution surveillance. By comparison the shore unit and its small boats have expanded their basic usefulness very little.

Aircraft in comparison to vessels and shore stations are short-lived. The increases in the aircraft technology has produced better and more capable aircraft over time. As aircraft capabilities increased the capacity to satisfy the SAR demand was exceeded with each replacement aircraft, and it was only reasonable to expect that this excess capacity would be applied to other missions. Today the air deliverable, anti-pollution transfer system (ADAPTS) of oil pollution containment is primarily dependent on aircraft.

An analysis of reconstruction projects for shore units is difficult in terms of cost-benefit. What would be the benefits of a new barracks to the SAR program? The

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[1] Robbins, Interview.

[2] U.S. Treasury Department, Coast Guard, The Story of Coast Guard Aviation, (Washington, D.C.: Government Printing Office, 1964), p. 8.

barracks could not respond to a case and therefore could not directly be credited with saving lives, preventing injuries or property damage. The new modernized barracks would certainly have benefits to the Coast Guard, possibly hard to quantify, but, nevertheless identifiable. The benefit would be classified as social or welfare oriented. The better living standards would have an effect on morale, job satisfaction and possibly even re-enlistment rate.

The real world of political pressures distorts the priorities of programs regardless of any benefit analysis. If the oil pollution containment project had been deferred to an improved habitability project then Congressional pressure would have been applied. Congressmen become aware of oil on beaches but not necessarily poor living and working conditions at Coast Guard stations. Programs with political interest get the spotlight and the funds.

Another factor that may have influenced the past poor funding for shore units may be based on pressures at the Departmental level. Having survived its infancy, the Department now seeks to expand and has called upon all agencies to seek Bold New Initiatives (BNI). Within the SAR program a pilot evaluation is underway to determine the feasibility of air cushion vehicles (ACV) for use in SAR.[1]

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[1] Captain James H. MacDonald, USCG, Chief, Surface Facilities Branch, personal interview, May 3, 1971.

This would be a revolutionary development in SAR surface facilities.

As a matter of comparison the search and rescue organization of Great Britain is described below. The search and rescue organization in Great Britain is comprised of mainly shore stations. These shore stations are organized similar to the early Life Saving Service of this country, having only one or two paid persons at each station with the bulk of the personnel volunteers. The operational statistics are very interesting. In 1970 they carried 2,592 rescue operations that resulted in the saving of 2,675 lives. The total budget was estimated at about $8 million.[1] By comparison the United States Coast Guard in 1969 saved 2,051 lives at a cost of $116 million.[2] A major difference between the operations in Great Britain and the United States lies in the fact that the British respond to calls where it is known that lives are threatened. In the United States a large percentage of cases are in fact non-serious. In a sample of SAR cases reported by shore units there were 605 non-serious cases in a sample of 942 cases checked, or 63 percent non-serious cases.[3] Typical non-serious cases include towing boats that have

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[1] United Kingdom, An Official Handbook, (London: Her Majesty's Signal Office, 1969), p. 509. (Cost includes operating expense and AC&I).

[2] Cost of the SAR program is for only operating expenses.

[3] Lieutenant Junior Grade, Gordon McDonald, Staff Programmer, SAR Systems Staff, personal interview, May 3, 1971.

run out of gas, towing boats with engine failures, towing becalmed sail boats, etc. These activities do not produce benefits that refer back to the program objective.

Cost-benefit analysis may assist in decision making; however, it may also create unforeseen problems in an effort to optimize benefits and minimize costs. The case cited below is a case in point.

> A LESSON LEARNED--A recent light station improvement project involved removal of the traditional lantern stop the light tower and the replacement of the classical lens light apparatus with an exposed airways type beacon. Strong and widespread public criticism of the "decapitated" lighthouse will probably require restoration to its original appearance at considerable expense to the Coast Guard. No estimate has been made of the cost of replying to the correspondence received, but it is not insignificant. The Commandant has responded to 14 letters, and the District Commander concerned has received even more letters. Since the situation kept changing, it was not possible to use one reply for all inquiries.[1]

Changes Needed in Present Process

A glaring weakness of the Coast Guard, in regards to its present planning process, is the lack of involvement of top management. If plans are to flow upward then policy decisions will have to slow downward in the organization. With competition among programs throughout the government,

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[1] U.S. Coast Guard, Commandant's Bulletin, No: 2-70, 9 January 1970, p. 3.

the very existence of an agency is threatened if poor planning is allowed to continue.[1]

It will be necessary to convince Congress that balanced hardware programs will not always be practicable. Rather a balance among missions on a priority basis should be suggested. Attempts should be made to phase hardware purchases in order to break the pattern of large amounts of equipment becoming obsolete in a short period.

The first item needing to be accomplished is the establishment of realistic program objectives and a guide as to relative priorities of missions and specific programs. Here top management interaction with staff level planning is required. Also needed are general policy guidance and information as to the Commandant's objectives and desires so as to serve as a coordination center or focal point for all planning efforts. A previous study called for a focal point for long range planning within the Coast Guard.[2]

If meaningful and effective planning is to be accomplished throughout the Coast Guard, then additional talent to provide appropriate staff elements with the required resources must be added. A review must be made of personnel assignment policies that rotate military personnel on the basis of calendar time. The training required for sophisticated planning dictates that planning specialists

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[1] Allen Shick, "The Road to PPB: The Stages of Budget Reform" Public Administration Review, December 1966, pp. 243-258.

[2] Alfred W. Saverbrey, Report on a Review of the Long-Range Planning Activities of the Treasury Department, (Washington: Brookings Institution, June, 1962), pp. 11-13.

be handled differently as to type and length of assignments. Many planning tasks require some operational experience for adequate task accomplishment. A mix of military and civilian personnel to comprise a planning group appears necessary to provide a blend of continuity and expertise.

An area for consideration would be the centralizing of planning efforts closer to top management. Considering the rise in the use of computers and top management's need for information, a rationale could be made for the centralization of planning efforts.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

This study has been focused on the shore station planning activity in the United States Coast Guard. Presently, the condition of the shore plant appears generally to be in a state of decay. Past budgets have not provided funds for adequate rehabilitation so that today a major rebuilding program looms before us. Shore unit planning has followed the lead of aviation since the 1950's in the formulation of plans. The present analytical tool, SARSIM, was a direct outgrowth of the shore station readiness model and it appears to have great impact on the management of SAR resource.

The material to answer the first subsidiary question "What has been the evolution of the present techniques?" was provided in Chapter III. The planning techniques have evolved over the years and have resulted in the analytical efforts that exist today. The analytical approach used today requires the establishment of objectives, statement of criteria and assumptions, projection of workload data, investigation of alternative solutions, and preparation of

full cost data. Additionally, it has been indicated that more than analytical techniques are required in the formulation of feasible plans. An assessment of the political factors, both internal and external, must also be made and accounted for.

As this evolution continues, it can be forecast that planning activity will be generated from within the service as well as being a reaction to outside demands. The advantage of such an evolution would be gained from being offensive and oriented toward strong programs rather than defensive. This growing trend will be characterized by a stronger, more demanding management that can look objectively upon itself with a critical eye.

The second subsidiary question was "Have the past shore station's plans been flexible in permitting attainment of partial objectives rather than cancellation of total plans?". In terms of the actual Shore Units Plan document, the planned funding level was never achieved and the plan became hopelessly out of date in two years and required revision. In 1964 the Plan was reissued in entirity without, however, a financial plan detailing annual projected levels of expenditure. The Plan has not been updated since 1964 and is considered ineffective as a planning document and remains only a source of shore station planning criteria.

The answer to the second question, therefore, is in the negative with qualification as to facility priorities.

The last two subsidiary questions will be dealt with collectively. The Coast Guard planning system has felt increasingly stronger pressures from outside sources. First the change to PPB caused a great deal of internal restructuring for the Coast Guard and all other federal agencies. The transfer to the Department of Transportation has caused pressure to adapt present programs to a safety-orientation. The transfer to the Department of Transportation also brought with it a greater input as to national priorities as can be witnessed by the concept of the Bold New Initiatives concept to planning. The advancement of the Coast Guard's research and development efforts in the areas of new programs and new resources attests to the fact that national priorities are serving as inputs to present planning.

In the general vein of improved management techniques required for advanced planning the Coast Guard is striving to make quantum leaps forward. In general, the external pressures have given impetus to Coast Guard management to maintain an adaptable framework for planning. The development of advanced planning models indicates the level of flexibility that is being designed into plans of the future.

Conclusions

The primary question of this research paper is, "Will the planning techniques presently used by the United States Coast Guard be satisfactory for developing future shore station programs?".

The answer to this question is in the affirmative, as the development of sound mission-oriented programs have become a reality. The capability for quantative analysis permits the manager to trade-off various alternatives to produce an optimum program in terms of cost and benefits.

It is clear that the Coast Guard has adopted techniques that allow for planning in the dynamic environment of the federal government. This dynamic planning which requires frequent interaction with top management will have the net effect of producing a flow of very competent managers within the Coast Guard.

The Coast Guard has utilized its fragmented and limited analytical capabilities to improve the management of its largest program--Search and Rescue. The effort of this analytical study has already borne significant fruit in terms of revised workweek standard and resource management. Valuable training of future planners has taken place while developing an overall improved capability. It is the conclusion of this thesis that the factors of change in

the federal system have brought about an increased planning capability that will be responsive to the dynamic forces under which it functions.

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